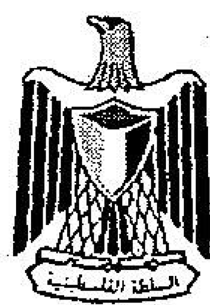
بسم الله الرحمن الرحيم



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General Phys. II, Second Exam(Spring2010)		مدرس المادة: د. سامي جبر
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Note: $1\mu = 10^{-6}$, $1n = 10^{-9}$ **(B)**

Q1. Read the following carefully and circle the symbol of the most appropriate answer for each question. (1.5pt. for each of a 10 right answers)

1. Capacitance measures the ability of the capacitor to store:

a) Charge on its surfaces; b) Electric energy between its surfaces;
c) Electric field between its surfaces; d) All of the above.

2. An air-filled parallel-plate capacitor is fully charged by connecting it to a battery. When the capacitor is disconnected from the battery and a dielectric is inserted between its plates. Which quantity (quantities) remains (remain) the same?

a) Its potential V; b) Its charge Q; c) Its capacitance C; d) All of them.

3. Three capacitors are connected as shown in **Fig. (1)**, where C_1 = 2.0 μF, C_2 = 1.0 μF, C_3 = 3μF. The equivalent capacitance (in μF) between points a and b is

a) 2; b) 0.75;
c) 1.5; d) 8.

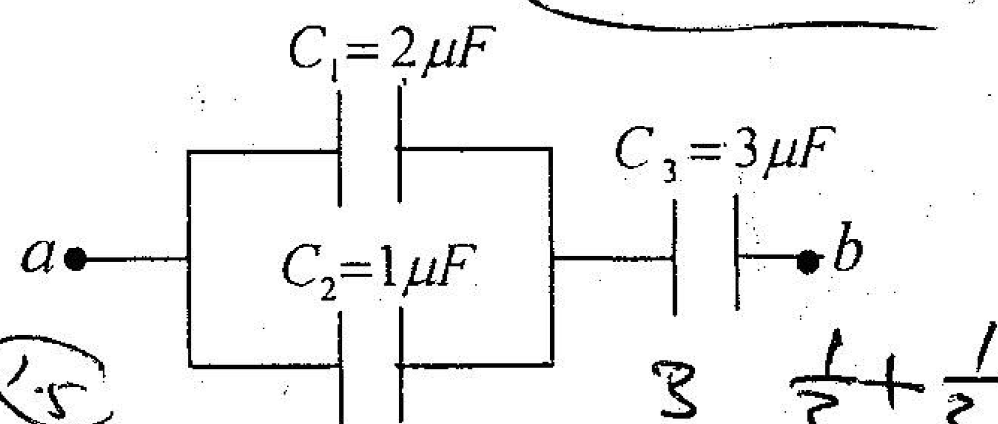


Fig.1

4. A 4.0 Ω resistor has potential drop of 8 V across its ends. The quantity of charge (in C) that pass through the resistor in 1 minute is

a) 180; b) 3;
c) 120; d) 30.

5. Electrical conductivity σ of a material depends on:

a) the applied electric field. b) the geometry of the material;
c) the current density in the material. d) physical quantities of the material;

6. The drift speed v_d in a material depends on:

a) the current in the material; b) physical quantities of the material;
c) the applied electric field; d) both b and c;

7. When charging a capacitor (**Fig.2**), the maximum current occurs

a) at the time equal its time constant;
b) at the moment the circuit is closed;
c) after a long time;
d) the current is constant, so no maximum occurs.

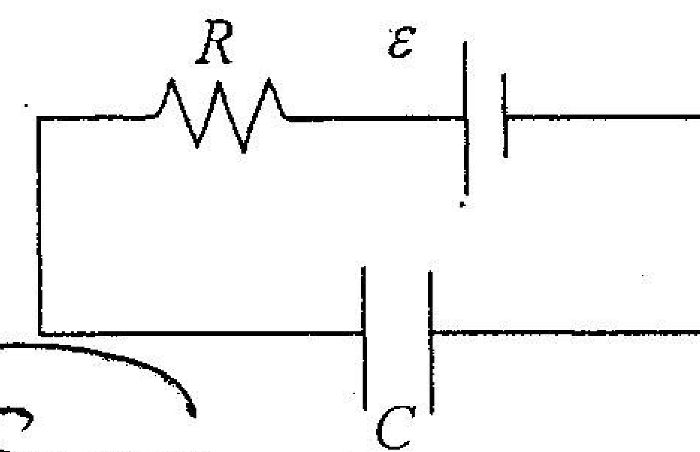


Fig. 2

Energy in Ps = 2X [energy in Capacitor]

8. In **Q7** (directly above) the total energy delivered by the power supply in **Fig. 2** is

a) $\frac{1}{2}C\varepsilon^2$; b) $2C\varepsilon^2$; c) $C\varepsilon^2$; d) $\frac{1}{2}\varepsilon C^2$.

9. The time constant in an RC circuit is the time at which

$T = RC$

$q(t) = 0$

$i(T) = 0.368\left(\frac{\varepsilon}{R}\right)$

$q(t) = 0.632\,C\varepsilon$

a) the energy stored becomes $1/e$ of its final value;
b) the current decreases to $1/e$ of its initial value;
c) a and b; d) the charge becomes $1/e$ of its final value.

10. Kirchhoff's **first rule** for currents at a junction is a statement of

a) conservation of energy; b) conservation of mass;
c) conservation of momentum; d) conservation charge.

$q(t) = C\varepsilon(1 - e^{-t/RC})$

11. In **Fig. (3)**, suppose that the switch has been closed for a long time sufficiently long for the capacitor to become fully charged, the charge Q on the capacitor (in μC) is.

a) 28; b) 12; c) 8; d) 16;

$\varepsilon = 10V$, 60Ω, 40Ω, $4\mu F$

Fig. 3

Q2. In **Fig. 4**, the current through the resistor R_2 is $I = 2A$,

a) What is the value of the currents I_1 and I_2? **(5pts)**

b) What is the value of ε_2? **(3 pts)**

c) What is the power dissipated in the 3Ω Resistor? **(2 pts)**

$\varepsilon_1 = 10V$, $R_1 = 4\Omega$, $R_2 = 3\Omega$, $I = 2A$, I_1, $R_3 = 6\Omega$, I_2, ε_2

Fig. 4

10

(a) Loop (1) :- apply Kirchhoff's Laws

$10 - 4I_1 - 3(2) = 0$ — (1)

$10 - 6 - 4I_1 = 0$

$4 - 4I_1 = 0 \Rightarrow 4 = 4I_1 \Rightarrow$

$I_1 = \frac{4}{4} = 1\,A$

$I_1 + I_2 = 2$ — (2)

$1 + I_2 = 2 \Rightarrow I_2 = 1A$

(b) Loop (2) :-

$3(2) - \varepsilon_2 + 6(1) = 0$ — (3)

$6 - \varepsilon_2 + 6 = 0$

$\varepsilon_2 = 12\ V$

(c) Power dissipated in the (3Ω) Resistor $= I^2R = (2)^2(3)$
$= (4)(3) = 12$ Watt

$I_1 = 1\,A$
$I_2 = 1\,A$
$\varepsilon_2 = 12V$
$P_{(3\Omega)} = 12$ Watt

End of the questions- Good Luck